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994,834

PATENT SPECIFICATION

DRAWINGS ATTACHED

994,834

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Int. Cl.:—F 01 c

COMPLETE SPECIFICATION

Improvements in or relating to Sealing Blades for Rotary Piston Internal Combustion Engines

We, REGIE NATIONALE DES USINES RENAULT, a French Body Corporate, of 8/10, Avenue Emile Zola, Billancourt (Seine) France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to blades adapted to seal the joint between the component elements of rotary-piston internal combustion engines which are subjected to the compression and expansion of the gases accomplishing their power stroke in working chambers.

It has already been proposed to use one-piece deformable sealing blades having properties enabling them to accommodate the deformations of the aforesaid component elements.

In this invention there is provided a sealing blade for sealing the joint between the rotor and stator members of a rotary piston internal combustion engine, wherein the sealing blade, which is mounted on one of the members, is sub-divided into a number of segments disposed side by side axially of the rotor to accommodate more closely the contour of the other member.

The blade may be segmented as simply as possible, that is, into two elements for very narrow rotors, but the higher the number of segments, the better the result, and this number is unlimited except for the complication arising from an excessive number of elements.

In order that the invention may be more fully understood, several embodiments will now be described, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a section taken across a rotary-piston internal combustion engine equipped with segmental blades;

Figure 2 is a fragmentary section showing on a larger scale a detail of the cross section of Figure 1;

Figure 3 is a front view showing a unitary blade disposed between the rotor and stator of the rotary-piston internal combustion engine; and

Figures 4 to 12 are similar views showing different forms of embodiment of segmental sealing blades fitted in corresponding slots of rotary-piston internal combustion engines.

In the drawings, Figures 1 and 2 are shown only to outline the structure of a rotary-piston internal combustion engine. In the example illustrated the four-lobed rotor 1 revolves within a stator 2 formed with five chambers and provided with end covers. The stator 2 comprises in slots or grooves 7 sealing blades 5 adapted to isolate the chambers from one another by bearing against the rotor 1. To this end, springs 6 fitted in the bottom of grooves 7 urge the blades against the rotor.

Figure 3 illustrates in fragmentary section a rotary-piston internal combustion engine wherein the generatrices of rotor 1 are not deformed and wherein a single blade can provide the fluid-tightness due to its efficient engagement with the rotor surface. In this figure, 1 is the rotor, 2 the stator, 3 and 4 the end covers, 5 the sealing blade and 6 the blade spring.

Figure 4 illustrates a rotor 1 of which the shape can be altered mainly by its expansion due to the gaseous combustion in the working chambers.

Each sealing blade is divided into a plurality of blade segments resiliently urged by separate springs. These segments position themselves automatically along tangents to the curves of the rotor generatrices moving past the blade segments inserted in a stator slot or groove. Figure 4 shows clearly the improvement resulting from this arrangement if the chord *a*, the deformed generatrix *b* and the tangents 8, 9 and 10 to this generatrix are considered.

Figure 5 shows segments assumed to move parallel to their position in the cold state. In this case the advantage resulting from the segmental blade disposal is moderate for it is clear that the blade should be divided into a greater number of segments, as shown in Figure 6. These segmental elements 11, in the example illustrated in Figure 6, are ten in number, each element being provided with a separate spring 12 engaging a recess formed in each segment 11 and bearing against the bottom 13 of the slot 14 formed in stator 2.

Figure 7 shows an embodiment comprising a great number of segmental elements 15, a single-coil spring 16 of generally flattened cross-section ensuring the desired resilient engagement with the rotor generatrices. The reference numerals 17, 17^1 and 18 designate in cross-sections typical examples of the coil-spring cross-sectional shape, the first two examples showing flattened springs and the third example a circular spring.

Figure 8 is another illustration of a deformable segmental blade wherein the segments 19 are of inverted T configuration and the springs 20 react against the side arms of each T and against the bottom of the stator groove.

It may be advantageous to provide a series of segments interconnected through flexible, spring-like members to facilitate the mass-production, storing and checking operations. The length of the segmental blade can easily be ascertained after assembly to check the axial plays between the assembled blade segments and the side flanges or plates.

Figure 9 is a view similar to Figure 8 and shows a modified embodiment wherein adjacent springs are linked by a ring 21.

Figure 10 shows another form of embodiment comprising a plurality of segments constituting a deformable sealing blade wherein each segment 22 is formed with a notch 23 on its upper face, each notch 23 being engaged by a correspondingly shaped portion of a single spring 24 consisting of a wire or strip.

Figure 11 illustrates another embodiment of a series of interconnected segments wherein each segment 25 is formed with two notches 26, 27, a spring 28 of adequate configuration engaging the adjacent notches of each two successive segments.

Figure 12 is another embodiment wherein the segments 29 also of inverted T configuration are each urged against the rotor by two coil springs 30, 31 disposed on either side of the central member of the T and adapted to engage a correspondingly notched counter-plate 32 acting both as a spring-receiving member and as a stop to limit the radial movement of the segments. Alternatively, the transverse arms of each pair of adjacent segments may be engaged by the same spring.

Moreover, this counter-plate 32 fills most of the volume of the blade-receiving groove, which may be advantageous for reducing dead space therein and thus prevents an appreciable fraction of gas from circulating along the groove.

WHAT WE CLAIM IS:—

1. Sealing blade for sealing the joint between the rotor and stator members of a rotary-piston internal combustion engine, wherein the sealing blade, which is mounted on one of the members, is sub-divided into a number of segments disposed side by side axially of the rotor to accommodate more closely the contour of the other member.

2. Sealing blade according to claim 1, wherein the blade segments are independent of one another.

3. Sealing blade according to claim 1, wherein the blade segments are interconnected through spring fasteners.

4. Sealing blade according to claim 1, wherein the complete set of segments constituting the blade is loaded by a single spring.

5. Sealing blade according to claim 1, wherein each separate segment or each group of segments is loaded by a single spring.

6. Sealing blade according to any preceding claim, wherein a counter plate which is fitted in a blade receiving groove acts jointly as a spring bearing member and as a check member for limiting the radial movement of the segments.

7. Sealing blade according to any preceding claim, wherein each segment is formed with a spring-receiving notch.

8. Sealing blade according to claim 1, wherein the segments are of inverted T configuration and the transverse arms of each pair of adjacent segments are engaged by the same spring.

9. Sealing blade for sealing the joint between the rotor and stator members of a rotary-piston internal combustion engine

substantially as hereinbefore described with reference to any one of Figures 4 to 12 of the accompanying drawings.

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994834 COMPLETE SPECIFICATION
3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

FIG. 1

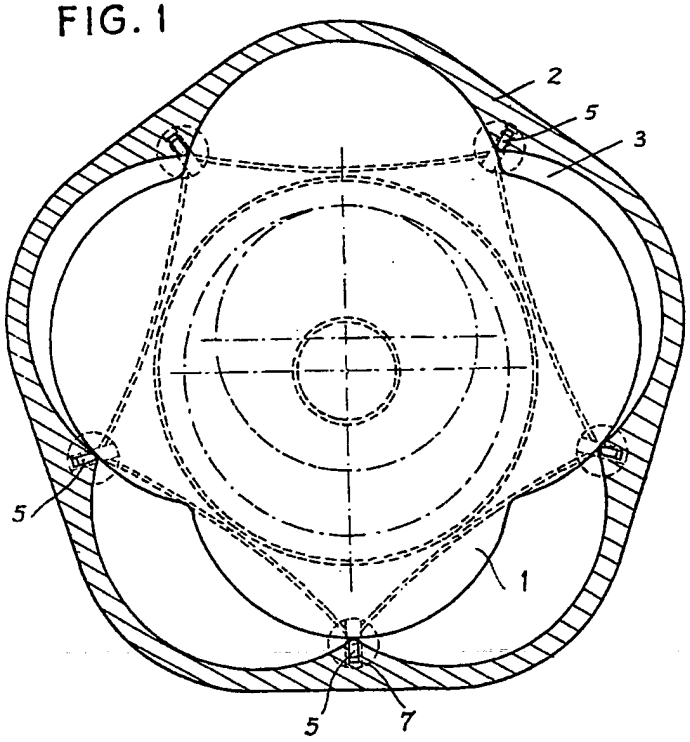


FIG. 2

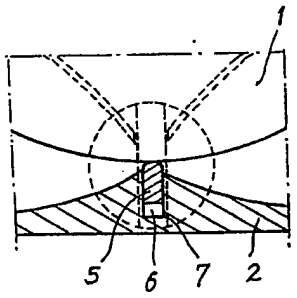


FIG.3

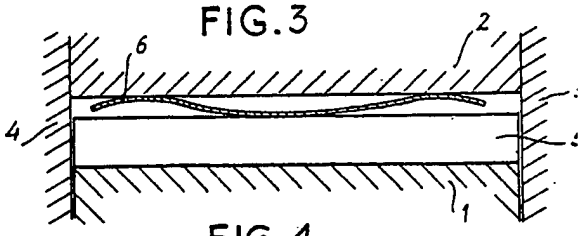


FIG.4

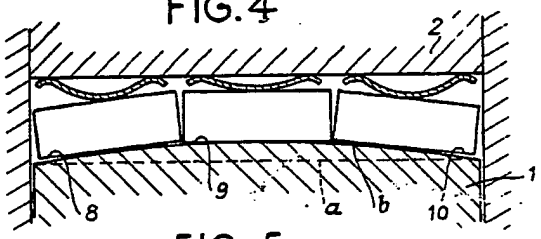


FIG.5

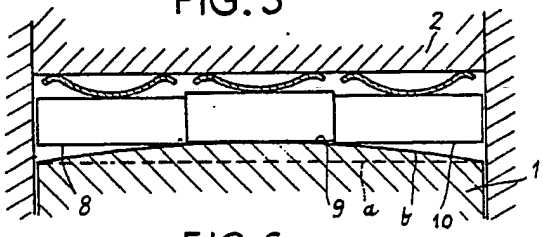


FIG.6

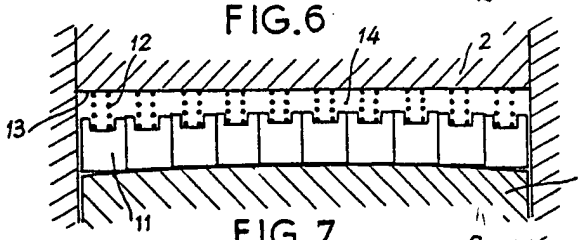
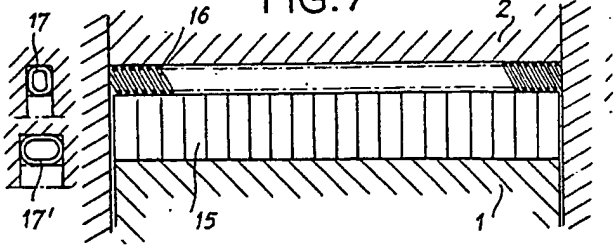


FIG.7



994834 COMPLETE SPECIFICATION
3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheets 2 & 3

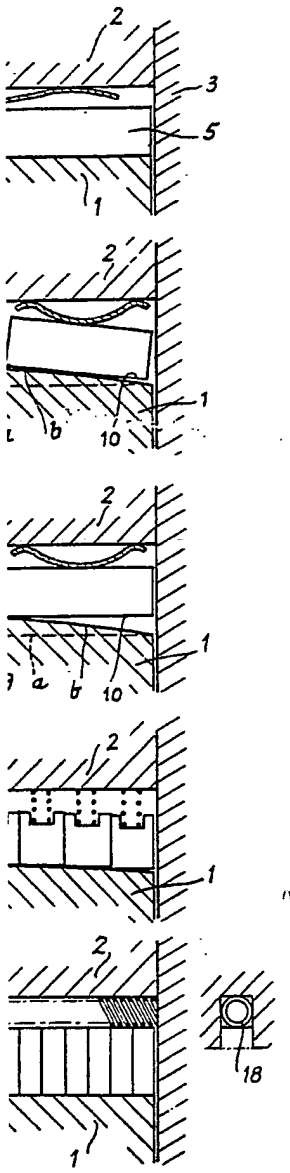


FIG. 8

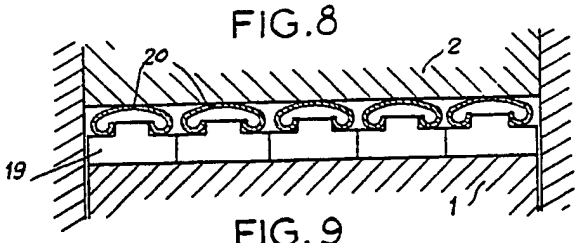


FIG. 9

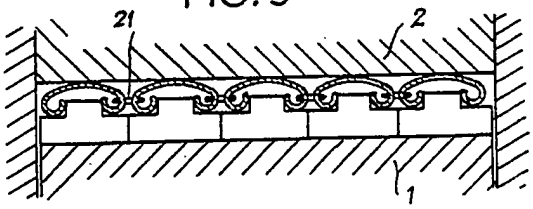


FIG. 10

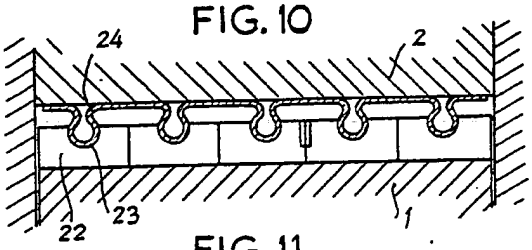


FIG. 11

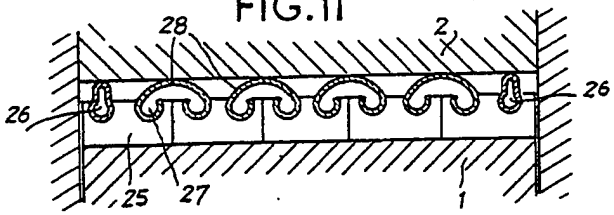


FIG. 12